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Joint Distribution for the Monty Hall Problem

3 doors: R=Red, G=Green, B=Blue

PrizeLoc	PlayerChoice	HostOpens	Switch?	Win?	P
R	R	G	N	Y	1/36
R	R	G	Y	N	1/36
R	R	B	N	Y	1/36
R	R	B	Y	N	1/36
R	G	B	N	N	1/18
R	G	B	Y	Y	1/18
R	B	G	N	N	1/18
R	B	G	Y	Y	1/18
G	R	B	N	N	1/18
G	R	B	Y	Y	1/18
G	G	R	N	Y	1/36
G	G	R	Y	N	1/36
G	G	B	N	Y	1/36
G	G	B	Y	N	1/36
G	B	R	N	N	1/18
G	B	R	Y	Y	1/18
B	R	G	N	N	1/18
B	R	G	Y	Y	1/18
B	G	R	N	N	1/18
B	G	R	Y	Y	1/18
B	B	G	N	Y	1/36
B	B	G	Y	N	1/36
B	B	R	N	Y	1/36
B	B	R	Y	N	1/36

For each of the following, indicate which random variables belong to Q, E, and H
(query vars, evidence vars, hidden vars)
Then use probabilistic inference to determine the value.

P(PrizeLoc=R, PlayerChoice=R) 1/36 x 4 = 1/9

P(PrizeLoc=R | PlayerChoice=G, HostOpens=B) 2/3

P(Win=Y) 1/2

P(Win=Y | Switch=N) 1/3

We assume Query variables are those whose marginals, conditionals, or probability subsets thereof are desired. Evidence variables are those having values given to limit the conditions under which query variable outcomes are considered, and Hidden variables are the remaining random variables in the table.

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